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Infiltration Trench

Description

An infiltration trench is a long, narrow, shallow excavation located over porous soils and back-filled with stone to form a subsurface reservoir to hold stormwater and allow it to infiltrate the soil. It can be used on small sites up to five acres in size. Infiltration trenches remove fine sediment and the pollutants associated with them.

Trenches may be "open" to the surface or enclosed below ground. Open trenches receive sheet flow of stormwater from surrounding sources. The sheet flow enters the trench through a layer of vegetated porous soil on the top of the trench. Grass filter strips remove coarse sediments which would plug the spaces between the stones and make the trench ineffective.

Below-ground trenches may receive higher concentrations of flow than above-ground trenches. With below-ground trenches, stormwater enters the basin through an inlet and pipe from the surface. The stormwater entering the trench must be pre-treated using a combination of buffer strips and multi-chambered catch basins to remove coarse sediments and oils.

Although use of infiltration practices is encouraged, if not properly designed, constructed, and maintained, contamination of groundwater can occur. Infiltration trenches should only be used as part of a "treatment train," where soluble organic substances, oils, and coarse sediment are removed by other management practices prior to stormwater entering the infiltration trench. This practice should not be used in industrial parks, high density or heavy industrial areas, or chemical or pesticide storage areas, or fueling stations.

Pollutants Controlled and Impacts

Infiltration trenches remove fine sediment and the pollutants associated with them. Coarse sediment may prevent the trench from operating properly and must be removed prior to entering it.

Soluble pollutants can be effectively removed if detention time is maximized. The degree to which soluble pollutants are removed is dependent primarily on holding time, the degree of bacterial activity, and chemical bonding with the soil. It is important to remember that if stormwater runoff contains high amounts of soluble contaminants, groundwater contamination can occur. If soluble contaminants are known to be present, either pretreatment or source elimination of the contaminants must be pursued.

The efficiency of the trench to remove pollutants can be increased by increasing the surface area of the trench bottom. Infiltration trenches can provide full control of peak discharges for small sites. They provide groundwater recharge and may augment base stream flow. They are effective at replacing infiltration lost due to the addition of impervious areas, and may be used strictly as a means to maintain the hydrologic balance after stormwater runoff has been treated by other means.

Infiltration Trenches

tion trenches will not significantly impact peak discharges of runoff, they are best used in conjunction with other BMPs; downstream detention is often still needed to meet peak runoff rate requirements.

Dissolved pollutants are effectively controlled for storm events less than the design storm, but these substances may not be removed from the runoff water as it infiltrates, and a portion could move to the groundwater. For this reason, the impact of infiltrated runoff on the groundwater should be considered, although in most cases, the magnitude of this impact is unknown. Chloride from road salt is an example of a soluble material that will not be removed during the infiltration process. Currently, there is much disagreement as to whether chlorides do, indeed, pose a significant threat to groundwater. A general guideline for groundwater protection is to design infiltration trenches with the bottom of the trench a minimum of 3 feet above the seasonally high groundwater table. This is consistent with the MPCA's guidelines for septic systems (MPCA, 2000). If the water table is too close to the ground surface, infiltration practices should not be used.

Figure 1 provides a schematic of a typical infiltration trench. Figures 2 and 3 illustrate two different examples of infiltration trench layouts- in a parking lot and in a median strip.

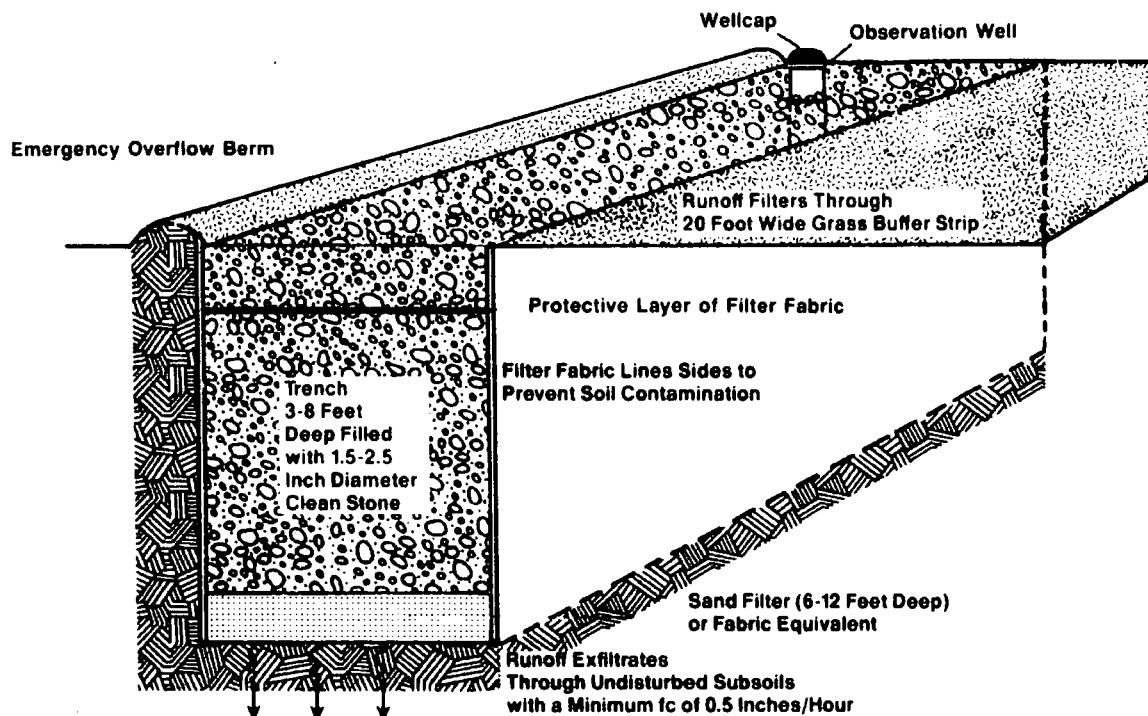
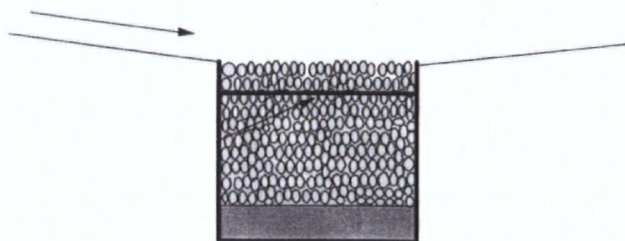


Figure 1: Typical Infiltration Trench Design

Source: Schueler, 1987.

Infiltration Systems

Infiltration Trenches



Description

Infiltration trenches are shallow (3- to 12-foot) excavations that are lined with filter fabric and filled with stone to create underground reservoirs for stormwater runoff from a specific design storm. The runoff gradually percolates through bottom and sides of the trench into the surrounding subsoil over a period of days. Infiltration trenches are typically implemented at the ground surface to intercept overland flows. Runoff can be captured by depressing the trench surface or by placing a berm at the down gradient side of the trench.

Infiltration trenches in this BMP Section refer to surface trenches that collect sheet flow from a few lots or properties as opposed to soakaway pits which are primarily used for a single lot application (see the On-Lot Infiltration BMP Section for information on this type of BMP).

Infiltration trenches require pretreatment of stormwater in order to remove as much of the suspended solids from the runoff as possible before it enters the trench. Pretreatment practices, such as grit chambers, swales with check dams, filter strips, or sediment fore-bays/traps should be a fundamental component of any BMP system relying on infiltration. Source controls should also be investigated (e.g., eliminate excessive sanding/salting practices). Public education with respect to street/driveway sediments should be provided in areas where an infiltration trench is proposed.

The design storm for an infiltration trench is typically a frequent, small storm such as the 1-year event. This provides treatment for the "first flush" of stormwater runoff. Infiltration trenches provide total peak discharge, runoff volume and water quality control for all storm events equal to or less than the design storm. This infiltration reduces the volume of runoff, removes many pollutants and provides stream baseflow and groundwater recharge.

Infiltration trenches have limited capabilities for controlling peak discharge for storms greater than the design storm. Because infiltra-

Purpose

Water Quantity

Flow attenuation



Runoff volume reduction



Water Quality

Pollution prevention

Soil erosion

N/A

Sediment control

N/A

Nutrient loading

N/A

Pollutant removal

Total suspended sediment (TSS)



Total phosphorus (P)



Nitrogen (N)



Heavy metals



Floatables



Oil and grease



Other

Fecal coliform



Biochemical oxygen demand (BOD)



	Primary design benefit
	Secondary design benefit
	Little or no design benefit

Percolation trench

From Wikipedia, the free encyclopedia
(Redirected from Infiltration trench)

A **percolation trench**, also called an **infiltration trench**, is a type of best management practice (BMP) that is used to manage stormwater runoff, prevent flooding and downstream erosion, and improve water quality in an adjacent river, stream, lake or bay. It is a shallow excavated trench filled with gravel or crushed stone that is designed to infiltrate stormwater through permeable soils into the groundwater aquifer.^[1]

A percolation trench is similar to a dry well, which is typically an excavated hole filled with gravel.^[2] Another similar drainage structure is a French drain, which directs water away from a building foundation, but is usually not designed to protect water quality.



Percolation Trench

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Application and design

Percolation trenches are often used to treat runoff from impervious surfaces, such as sidewalks and parking lots, on sites where there is limited space available for managing stormwater. They are effective at treating stormwater only if the soil has sufficient porosity. To function properly, a trench must be designed with a pretreatment structure such as a grass channel or swale, in order to capture sediment and avoid clogging the trench.^[3] It may not be appropriate for sites where there is a possibility of groundwater contamination, or where there is soil with a high clay content that could clog the trench.^[4]

See also

- Best management practice for water pollution
- Infiltration basin
- Sustainable urban drainage systems
- French drain

References

- [↑] Metropolitan Council. St. Paul, MN. "Minnesota Urban Small Sites Best Management Practice Manual." "Infiltration Trenches." July 2001.
- [↑] Metropolitan Area Planning Council. Boston, MA. "Massachusetts Low Impact Development Toolkit." "Infiltration Trenches and Dry Wells." 2005.
- [↑] Atlanta Regional Commission. Atlanta, GA. "Georgia Stormwater Manual: Volume 2." Section 3.2.5:

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